PATENT APPLICATION
Navy Case No. 77,897

BEFORE THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Imam et al.	) Examiner: Copenheaver, B
Serial No. 08/845,897	) Group Art Unit: 1771
Filed: April 28, 1997	)
For: POROUS METAL/ORGANIC POLY-MERIC COMPOSITES	)
	) February 16, 2001

Part 2 of 3

SUBSTITUTE APPEAL BRIEF

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

This is an appeal from the final rejection of claims in the Examiner's Action dated April 19, 2000, finally rejecting claims 1-4, 7, 11, and 17-22.

I. REAL PARTY IN INTEREST

The real party in interest herein is the United States Government, as represented by the Secretary of the Navy.

II. RELATED APPEALS AND INTERFERENCES

The appellants are aware of no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-22 are pending in this application. Of these, claims 1-4, 7, 11 and 17-22 have been finally rejected by the Examiner, and claims 5, 6, 8-10, and 12-16 have been withdrawn from consideration by the Examiner.

IV. STATUS OF AMENDMENTS

Appellants filed an Amendment on November 13, 2000, which was not entered pursuant to the reasons stated in the Advisory Action of January 18, 2001. Applicants are filing an Amendment Under 37 C.F.R. § 1.116 herewith.

V. SUMMARY OF THE INVENTION

1. An acoustically damping composite article, comprising

Page 3, lines 4-5.

a non-elastomeric polymer matrix

Page 9, lines 14- 16, and Page 12, line 1.

having therein a metal foam,

Page 17, line 25 to Page 18, line 5.

said metal foam having an open cell structure, said metal foam being impregnated with said polymeric matrix

Page 5, lines 12-15.

so as to completely penetrate said open cell structure of said foam and fill the cells thereof.

Page 8, lines 17- 20.

2. The composite article of claim 1, wherein said metal is selected from the group consisting of aluminum, aluminum base alloys, titanium, titanium base alloys, nickel, nickel base alloys, copper, copper base alloys, iron, iron base alloys, zinc, zinc base alloys, lead, lead base alloys, silver, silver base alloys, gold, gold base alloys, platinum, platinum base alloys, tantalum, and tantalum base alloys.

Page 5, lines 15-18.

3. The composite article of claim 1, wherein said polymer is selected from the groups consisting of epoxies, acrylics, hardened silicones, polyurethanes, polyamides, polyvinyls, polycarbonates, hardened natural rubbers, hardened synthetic rubbers, phenolics, polyolefins, polyamides, polyesters, fluoropolymers, poly(phenylene ether ketones), poly(phenylene ether sulfones), poly(phenylene sulfides) and melamine-formaldehyde resins.

Page 9, lines 17-23.

4. The composite article of claim 1, wherein said metal is an aluminum base alloy foam.

Page 5, lines 16-17.

7. The composite article of claim 3, wherein said metal is aluminum foam or an aluminum base alloy foam.

Page 5, lines 16-17.

11. The composite article of claim 1, wherein said polymer is an epoxy.

Pages 9, 18.

17. The composite article of claim 1, wherein said cells have a locally uniform diameter.

Page 7, lines 9-17.

18. The composite article of claim 1, wherein said metal foam has a gradation of pore sizes in at least one direction along the metal.

Page 7, lines 17-23.

19. A composite article according to claim 1, wherein said composite article is in the form of a sheet.

Page 10, lines 25 to Page 11, line 3.

20. A laminate comprising a stack of sheets according to claim 19 bonded together.

Page 12, lines 13-15.

21. An acoustically damping composite article, comprising a polymeric matrix having therein a metal foam,

Page 3, lines 4-5, Page 9, lines 14-16, Page 12, line 1,and Page 17, lines 25 to Page 18, line 5.

said metal foam having an open cell structure,

Page 5, lines 12-15.

said metal foam being impregnated with said polymeric matrix

Page 5, lines 12-15.

so as to completely penetrate said open cell structure of said foam and fill the cells thereof,

Page 8, lines 17-20.

said metal foam thickness no less than 3 times the average diameter of said cells.

Page 11, lines 3-6.

22. A method of forming a composite comprising the steps of:

Example 2, Page 14, line 10.

impregnating a metal foam,

Example 3, Page 15, lines 6-10.

said metal foam having an open cell structure,

Example 3, Page 15, lines 3-6.

with a resin component

Example 3, Page 15, lines 6-10.

so as to completely penetrate said open cell structure of said foam

Example 3, Page 15, lines 11-13.

and fill open cells of said metal foam with said resin component; and

Example 3, Page 15, lines 11-15.

converting said resin component within said cells, to a bulk solid, non-elastomeric polymerized resin;

Page 8, lines 9-14, and Page 9, lines 13-16.

thus forming a composite comprising a matrix of said non-elastomeric polymerized resin,

Page 5, lines 12-15, and Page 9, lines 13-16.

said matrix having therein said metal foam.

Example 7, Page 18, lines 2-8.

VII. ISSUES

A. Whether claims 1-4, 7, 11, 19, and 20 are anticipated by Tsang et al. (U.S. Patent No. 4,605,595) under 35 U.S.C. § 102(b).

B. Whether claims 1-4, 7, 19, and 22 are anticipated by, or rendered obvious by, Reitz (U.S. Patent No. 4,759,000) under 35 U.S.C. § 102(b) or § 103.

C. Whether claims 17, 18, 20, and 21 are rendered obvious by either Tsang or Reitz under 35 U.S.C. § 103.

VIII. GROUPING OF CLAIMS

The claims stand or fall together.

IX. ARGUMENTS

A. Claims 1-4, 7, 11, 19, and 20 are not anticipated by Tsang et al. (U.S. Patent No. 4,605,595) under 35 U.S.C. § 102(b).

In making the rejection over Tsang, the Examiner urges that Tsang "discloses that suitable binders include epoxy resins and phenolic resins" and therefore "anticipated the claimed subject matter." Appellants respectfully disagree, for the reasons set forth below.

The claimed invention is "an acoustically damping composite article, comprising . . . a metal foam . . . having an open cell structure . . . impregnated with [a] polymer matrix so as to completely penetrate said open cell structure of said foam and fill the cells thereof." This requires that the polymer matrix fills the cells of the foam, thereby providing the desired acoustically damping properties of the invention.

The specification teaches that the "resin component may be a neat resin or a neat blend of resins, or may include any catalysts, curing agents, or additives desired." Specification at page 8. However, upon curing, these are all part of "the resin component" as the specification teaches and as persons of ordinary skill in the art would understand.

In contrast, Tsang et al. teaches away from this requirement, by teaching the use of fillers, friction modifiers, and reinforcing fibers in the epoxy. persons of ordinary skill in the art would not take any of these to be part of the resin. Neither does Tsang et al. describe them that way. Tsang et al. teaches that the resin binds together the fillers, friction modifiers, and reinforcing fibers. To the extent that the epoxy taught by Tsang et al. contains fillers, reinforcing materials, etc., it cannot "fill the cells" since some of the volume within the cells will be occupied by the fillers, friction modifiers, and reinforcing materials rather than the polymer. Indeed, from reading Tsang et al., one is left with the impression that most of the volume within the cells will be taken up by the these fillers, friction modifiers, and reinforcing fibers, since these are the components that provide the properties Tsang et al. desires for this "Friction Article".

The Examiner has raised two points in response to this argument. The Examiner urges "First, the composition of Tsang, which includes both resin and filler, fully fills the cells of the open foam. The fact that the composition contains fillers does not preclude the fact that the voids are filled with the impregnate." However, these claims require more than that the cells are filled. The claims require specifically that the cells are filled with the polymer. Since cells that are filled both with polymer and other materials can't be fully filled with the polymer, Appellants must respectfully disagree with the Examiner on this point.

The Examiner further urges "Second, [Appellant's] claims read on embodiments where the impregnate contains fillers (See specification, lines 2 and 3)." The cited passage reads: "The resin component may be a neat resin or a neat blend of resins, or may include any catalysts, curing agents, or additives desired." However, on its face this passage refers only to a resin component, and not to other components in the cells. The clear meaning of this passage is that it refers only to the composition of the resin. It does not fairly refer to additional materials (such as fillers, friction modifiers, and reinforcing fibers) other than the resin that may be in the cells.

B. Claims 1-4, 7, 19, and 22 are neither anticipated by, nor rendered obvious by, Reitz (U.S. Patent No. 4,759,000) under 35 U.S.C. § 102(b) or § 103.

In making the rejection over Reitz, the Examiner urges that "Reitz discloses the claimed invention [except] for literally disclosing that the metal foam is an open celled foam" but that "it appears that the foam must inherently be an open cell foam because the pores of the foam are filled with the impregnate (column 9, line 67 to column 10, line 11)." Appellants respectfully disagree, for the reasons set forth below.

The structure taught by Reitz is "a porous metal foam such as aluminum-nickel impregnated with rubber." Column 9 lines 67-69. In contrast to the elastomer impregnate taught by Reitz, the claimed invention requires "a non-elastomeric polymeric matrix" (claim 1).

The Examiner notes in response that Reitz teaches a hardened silicone rubber as a suitable polymer, and that this appears to read on Appellant's definition of a non-elastomeric polymer. However, although both Appellants and Reitz refer to hardened silicone rubber, they are clearly referring to very different materials. Appellants have limited their claims to articles where the polymer has been cured to where it is no longer an elastomer. In contrast, Reitz never teaches or suggests curing the polymer nearly so far. Reitz, in teaching that the silicone rubber is "permitted to cure or harden" is teaching only that it is allowed to cure sufficiently so that it is no longer liquid (col. 10, lines 1 and 2). Reitz's silicone rubber is clearly still an elastomer since (1) a fully cured, non-elastomeric polymer requires heating, not simply "permitting" the liquid to cure, and (2) persons of ordinary skill in the art would recognize that a polymer sheet that must be "watertight" (col. 10, line 12) will be an elastomer, rather than a fully cured non-elastomer. On this latter point, the Board is invited to consider known materials that are used for watertight gaskets.

Reitz's description of the properties of this "hardened silicone rubber" emphasizes that Reitz and Appellants are talking about completely different materials. Reitz describes the "hardened silicone rubber" structure as "an acoustic window . . . not . . . an acoustically absorptive material". Column 10 lines 3-4. In contrast, Appellants' non-elastomeric hardened silicone rubber is acoustically absorptive. When Reitz has a need for a material with this property, he turns to something completely different: strands of wire immersed in a viscous fluid, mechanically coupled to a resonating mass (see, e.g., abstract).

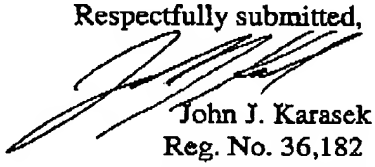
C. Whether claims 17, 18, 20 and 21 are rendered obvious by either Tsang or Reitz under 35 U.S.C. § 103.

For the reasons set forth above, incorporated by reference herein, this basis of rejection is likewise respectfully traversed.

X. CONCLUSION

For the foregoing reasons, Appellants respectfully urge reversal of all the outstanding rejections. Kindly charge any additional fees due, or credit overpayment of fees, to Deposit Account No. 50-0281.

Respectfully submitted,



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Appendix - The Claims on Appeal

What is claimed is:

1. (Amended) An acoustically damping composite article, comprising a non-elastomeric polymeric matrix having therein a metal foam, said metal foam having an open cell structure, said metal foam being impregnated with said polymeric matrix so as to completely penetrate said open cell structure of said foam and fill the cells thereof.

2. The composite article of claim 1, wherein said metal is selected from the group consisting of aluminum, aluminum base alloys, titanium, titanium base alloys, nickel, nickel base alloys, copper, copper base alloys, iron, iron base alloys, zinc, zinc base alloys, lead, lead base alloys, silver, silver base alloys, gold, gold base alloys, platinum, platinum base alloys, tantalum, and tantalum base alloys.

3. The composite article of claim 1, wherein said polymer is selected from the groups consisting of epoxies, acrylics, hardened silicones, polyurethanes, polyamides, polyvinyls, polycarbonates, hardened natural rubbers, hardened synthetic rubbers, phenolics, polyolefins, polyamides, polyesters, fluoropolymers, poly(phenylene ether ketones), poly(phenylene ether sulfones), poly(phenylene sulfides) and melamine-formaldehyde resins.

4. The composite article of claim 1, wherein said metal is an aluminum base alloy foam.

5. Withdrawn

6. Withdrawn

7. The composite article of claim 3, wherein said metal is an aluminum foam or an aluminum base alloy foam.

8. Withdrawn

9. Withdrawn

10. Withdrawn

11. The composite article of claim 1, wherein said polymer is an epoxy.

12. Withdrawn

13. Withdrawn

14. Withdrawn

15. Withdrawn

16. Withdrawn

17. The composite article of claim 1, wherein said cells have a locally uniform diameter.

18. (Amended) The composite article of claim 1, wherein said metal foam has a gradation of pore sizes in at least one direction along the metal

19. A composite article according to claim 1, wherein said composite article is in the form of a sheet.

20. (Amended) A laminate comprising a stack of sheets according to claim 19 bonded together.

21. (Twice amended) An acoustically damping composite article, comprising a polymeric matrix having therein a metal foam, said metal foam having an open cell structure, said metal foam being impregnated with said polymeric matrix so as to completely penetrate said open cell structure of said foam and fill the cells thereof, said metal foam thickness no less than 3 times the average diameter of said cells.

22. A method of forming a composite comprising the steps of:

impregnating a metal foam, said metal foam having an open cell structure, with a resin component so as to completely penetrate said open cell structure of said foam and fill the open cells of said metal foam with said resin component; and

converting said resin component, within said cells, to a bulk solid, non-elastomeric polymerized resin, thus forming a composite comprising a matrix of said non-elastomeric polymerized resin, said matrix having therein said metal foam.